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ABSTRACT

The purpose of this study was to inquire into the relation of intellectual and/or psycho-linguistic development and apparent improvement in other behavior factors such as affective and social behavior and development. Thus consideration is given to the second cybernetics (i.e. the concept of positive feedback or deviation-amplifying relationships in intellectual or psycho-linguistic development and its possible relation to affective and social behavior and development. A five-year experimental "pilot" program has been conducted for 40 three, four, and five-year-old children, half of whom are educationally deprived. Use of the Edison Responsive Environment equipment was the mainstay of instruction for the acquisition of skills leading to reading, typing and number concepts. Participation was voluntary up to 20 minutes a day. Pre-post change scores revealed that training had a great impact on the development of psycho-linguistic abilities. Furthermore, favorable results have been obtained in children with multiple behavior disorders. There was improvement on behavior factors other than intellectual achievement. (Author)

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DEVIATION-AMPLIFYING PROCESSES AND INDIVIDUAL HUMAN GROWTH AND BEHAVIOR

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Pre-post change scores revealed that training had a great impact on the development of psycho-linguistic abilities. Furthermore, favorable results have been obtained in children with multiple behavior disorders. There was improvement on behavior factors other than intellectual achievement.

DEVIATION-AMPLIFYING PROCESSES AND INDIVIDUAL HUMAN GROWTH AND BEHAVIOR

INTRODUCTION

Deviation-counteracting mutual causal relationships, or the first cybernetic (i.e. the concept of negative feedback), in human systems as compared to machines or animals has been previously considered both theoretically and experimentally.[1]

The purpose of this paper is to consider the second cybernetics (i.e. the concept of positive feedback), or deviation-amplifying mutual causal relationships in intellectual or psycho-linguistic development and its possible relation to affective and social behavior and development.

The further purpose of this study is to consider deviation-amplifying processes in human growth and development and its relation to other control system features, such as deviation-counteracting processes, and adaptive and adapting systems.

The concept of deviation-amplifying processes has had a brief history, dating back to 1963 to Maruyama's article which has been reprinted in Buckley's excellent anthology on "Modern Systems Research for the Behavioral Scientist."

Efforts have been focused on that aspect of cybernetics which dealt with self-regulating and equilibrating systems. Automatic steering devices, biological processes regulating body temperature, thermostats, chemical and physical processes, were all studied as falling within one general mathematical model of deviation-counteracting feedback networks.

Maruyama attempts to focus on deviation-amplifying systems, such as "accumulation of capital in industry, evolution of living organisms, the rise of cultures of various types, interpersonal processes which produce mental illness, international conflicts, and the processes that are loosely termed as 'vicious circles' and 'compound interests'".[2]
All of these exhibit processes of "mutual causal relationships that amplify an insignificant or accidental kick, build up deviation and diverge from the initial condition".[3]

While deviation-counteracting and deviation-amplifying processes may appear to be opposite types of systems, they are systems of mutual feedback and hence are to be subsumed under the subject matter of cybernetics.

DEVIATION-AMPLICATION AND ECONOMICS

Maruyama considers that the concept of diviation amplifying process was formulated and fruitfully applied even before the advent of cybernetics. He cites the field of economics as an example. He states, that the old model, which was a deviation counteracting model, between the income level of the lower class and the number of children, claimed that it was useless to raise the standard of living of the lower class because more children would be produced and thus reduce their standard of living to the original level. In other words the poor stay poor and the rich stay rich. It was this theoretical model that led the policy makers to adopt a laissez-faire policy.

However, it was also known that "the more capital, the more rapid the ratio of its increase". This is now a deviation-amplifying process by which the poor become poorer and the rich become richer.

More elaboration and mathematical sophistication was subsequently added to

this theory of mutual causal process. Myrdal pointed out that in economically well-developed countries, regional, social and hierarchical differences in economic level tend to decrease. In economically underdeveloped regions, differences between the poor and the rich increase.

What was distinctive was that an economically underdeveloped society was operated under a laissez-faire policy and the free play of market forces. Hence the few priviledged accumulated more wealth and power while the living standard of the poor tended to fall. Low standard of living, poor health, and low efficiency aggravate one another, and racial or social discrimination and other social, psychological or cultural factors could be added to complete the "vicious circle".[4]

Similarly, between nations, world free trade is profitable for rich countries and detrimental for poor countries.

It is this deviation-amplifying reformulation of the economic theory that "affects the public policy toward the direction of planned economy within economically underdeveloped countries and controlled international trade".[5]

Maruyama notes further that Myrdal pointed out the importance of the direction of the initial kick, which then determines the direction of the subsequent deviation-amplification in the planned economy.

The following must be noted. The claim of economists that a higher income in the lower class would reduce their standard of living is not due to the fact that they would produce more children but would be due to the fact that more children would live, and also that they would live somewhat longer. Hence a decrease in standard of living. Furthermore an underdeveloped country cannot afford to educate and train all the children in

the country since a return on such training only begins to pay off after the age of mortality. Underdeveloped countries are forced to socialism, for they cannot afford the development of aggressive entrepeneurs who (as it happened in the United States) would concentrate capital for development, for this takes at least four generations to recycle and additionally is a very wasteful process.[6] A certain amount of concentration of wealth must take place so that capital can be used to develop the country. In poor societies, aggressive entrepeneurs cannot generally exist because capital is scarce (viz in a society where gold is used as jewelry and not for investment).[7]

It should also be noted that the process of economic development entails some dislocation of farm labor, the problems of industrialization, and the take-off stage into a technologically efficient society where the returns in investment are very high.

Maruyama is attempting to relate this process to some psychological explication of a deviation-counteracting or deviation-amplifying, i.e. a deviation synthesizing process. This is not an accurate account.*

At the end of the reign of Louis XIV, Colbert's regulatory system had plagued France with a multiplicity of tariffs from province to province, suffocating trade and hampering production.

Economic chaos and public destitution threatened the country. The solution appeared to be to reverse restraints and free the economy. At the time,

* I am indebted to Dr. R. Schulman, Professor of Economics, Drexel University for critical discussions relating to the above, albeit all misrepresentations remain the responsibility of the author (Steg).

the physiocrats believed that the economy would run automatically and regulate itself without human interference due to the laws inherent in the system. The physiocrats were impressed with the discovery that the blood circulates through the body, that it deposits certain ingredients and acquires others, that the same points in the body were touched at regular intervals, with exactly the same composition it had when it last passed, unless affected by sickness or injury or other environmental factors.

Economics appeared as "the physiology of society" and the doctrine had it that "the wealth of society reproduces itself through production, exchange and distribution in a strictly lawful harmonious way".[8]

The following comments pertain to the above:

- Abolishing provincial taxes was done so as to enable the king to amass the money.
- The reason that the physiocrat's theory of "laissez-passer" could hold was that anything that could be produced at that time in that area of trade could be sold. The only problem they faced was to produce enough. (Today, the problem in economics, in technologically advanced nations, is distribution, rather than production.)
- The importance of the control function in a self-regulating system was not recognized.
- "Laissez-faire" or more accurately laissez-passer cannot be considered as indicative of laissez-faire. It was even more a form of control than our present-day planning. (After all, it was Quesnay who produced the tableau economique, the first input-output table.)
- Maruyama can be viewed in a Hegelian sense, in that he indicates the swing of the pendulum, but he is confusing results with causality.

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DEVIATION-AMPLIFICATION AND EVOLUTION

Maruyama's second detailed example is from the process of evolution. He considers it as deviation-amplifying in several ways.

> "First, there is the deviation-amplifying mutual process between the mutations and the environment. For example, suppose that some mutants of a species can live at a lower temperature than the 'normal' individuals. Then the mutants may move to an environment which is colder. Further mutations occur. Some of the mutants are unfit for the low-temperature environment and die off. But some other mutants are able to live in a much colder climate than their parents. They move to a still colder environment. The cold climate eliminates any new mutants that are unfit for cold climates. The 'average' individuals of the survivors are then fit for the cold climate. The chance of the species, or at least some members of the species, to move to a still colder environment are now greater than before. Thus, the selection of, or accidental wandering into, a certain type of environment and the direction of survivable mutations amplify each other."

Although Maruyama also states, quite correctly, that an organism may not only move in a new environment, but may also create his own environment, the typical example being Homo Sapiens,[9] Maruyama does not consider general control system features. For instance how does deviation amplifying or deviation counteracting processes enter into building "his own environment"?

We thus need to make some preliminary statements about the approach to analysing control systems in general.

Before an agglomerate of elements is subjected to system analysis, it is important to make sure that we have isolated an organized mass with purposive homogeneity of its elements, that truly form a working system. If we are confronted with purposively heterogeneous elements that pull in various directions we are just witnessing a transient state of some sort that in the end will have to break down and be replaced by a purposive homogeneous grouping, forming a controlled whole, subject to system control analysis.

Thus, the transient state of decay of the feudal system, accompanied by upheavals and wars, is characteristic only of the breakdown of the feudal system but is hardly indicative of feudalism itself before it reached its decaying stage.

In other words, fruitful system analysis is possible only with a satisfactorily operating control system. We can no more arrive at the description of the characteristics of the control system governing human relations when analysing the transient state, than we can analyse a thermostatically controlled heating system in a building which is burning and collapsing during an earthquake. The overriding criterion governing human society since the dawn of history, is that its system of controls is purposively directed toward embracing a continuously larger section of the surrounding nature. As part of this latter characteristic the continuing quest for freedom of action in society is no different than the quest for freedom than the constraits imposed by the elements of nature.

As to control systems in general, the system as a whole is called an adaptive system. If it were not adaptive, it could not survive. The system adapts itself to the system requirements otherwise the system could not operate. Thus, the whole system is adaptive. If one element works against the system then the system would be inoperative. In an adapting system the rule holds here too. Every element in the system must be adaptive. The elements that are in it must be adaptive to make the system operative. The adapting character of a system applies to elements external to the system. An adapting system is subject to all the laws of adaptive systems as far as its components are concerned. Whether the feedback is positive or negative the system is subject to the basic law and behavior of adaptive systems: that its elements are adaptive in the system. It is only when the relation towards elements outside of the system are considered that systems can be adapting or adaptive. The system can modify the environment (adapting) or be itself modified by the environment (adaptive). In the theory of evolution we have an example of the system depending for its survival on adaptation to the environment. But in addition, the system thus evolved, is an adapting system in the sense that the environment is

then adapted to the system by modification of the environment, such as building of shelters, production of food, and so on.[10]

Machines, as we know them now, are built with a special purpose which eliminates noise signals. The input is meant to be noiseless. In biological systems, in animals, the signal is barely distinguishable from the noise. The level of the signal, be it auditory or visual, is very close to the random signal.

All theories, be it the theory of evolution, the theory as to the origin of life resulting from the interaction of organic material and the environments, presume that all signals are noise signals (i.e. random signals).

The theory of evolution states that the fittest survives because the environment is in his favor. For instance, if a bird that sees is suddenly in an environment without light, these signals, or this input to his vision, are no longer available. However, other signals, or inputs through hearing for instance, would continue as before, but now the bird could use these signals to greater advantage and could develop some radar feeling.

Originally, auditory signals are only noise, and, in order for these signals (that the bird, or any animal gets) to be effective in evolution (i.e. develop hearing) only specific danger signals may be picked out. Now, birds for instance, begin to distinguish. The evolutionary process is the picking out of some specific signals from random signals. Evolution is then discriminatory selection of signals from noise. Or again, picking out some specific signals from random signals.

Logically, an organism that does not have that specific ability, cannot evolve in that direction. Signals given to compute (noiseless information) are distinctive from signals (noise information) which an organic system receives. An organic system gets noise information and adapts this infor-

mation so as to segregrate between signals. This is what distinguishes organic from non-organic systems.

What are results and what are causes must be thus carefully differentiated.

DEVIATION-AMPLIFICATION AND APPLIED BEHAVIORAL SCIENCE

The concept of "laissez-faire" pervaded other fields including psychology and education.

Up to the nineteen-thirties and into the forties the counsel from experts on child rearing was to let the children be while they grow and to avoid excessive stimulation. Hunt states that:

> "Perhaps the negative correlations found between intelligence test scores for the first two years and the late adolescent level of intelligence may possibly be attributable to such counsel, inasmuch as it would be those educated people at the higher levels of tested intelligence who read and can act in terms of what they read who would have been most likely to follow this advice". [11]

What was thought of as laissez-faire in education, or what is now considered as the traditional curricula, consisted

> "largely of group activities and free play to promote the spontaneity, the muscular growth, and the social adjustment of the highly controlled children of middle-class mothers". [12]

We can no more consider this "laissez-faire", than the parallel situation in other fields such as economics.

Since 1966, an experimental pilot program to find new approaches to help children learn has been conducted for 40, three, four and five year old children, half of whom are "Get-Set" (children from low economic status) and half are tuition paying children. They are integrated racially and economically, and include mentally and physically "exceptional" children in the same percentage that is found in the population at large (10%). Over half of the children are educationally deprived.

Use of the Edison Responsive Environment equipment is the mainstay of instruction for the acquisition of skills leading to reading, typing and number concepts.

We must however distinguish between education and training. Training involves the learning of some specific pattern of behavior, be it equilibrium on a tight rope or chess playing, etc., while education concerns the development of new, not previously learned behavior.

Thus, in every field of human endeavour, education would lead to accomplishments beyond the learned patterns. The result of education is creativity, while the result of training is performance involving skill and not necessarily creativity.

What brings into focus this difference, could be illustrated by the example of a trained "specialist" able to make a copy of a Vermeer which is hard to distinguish from the original. Whether it is in the field of painting or literature, or music, a masterwork can be recognized by the individual master's style. A work by Rubens, Borodin, or Hemingway is traceable to the author by the average layman, provided he had some basic training in the particular field. The training involved would be a training to paint, compose music or write literary composition. While this kind of training is predicated on the assimilation of some previous experience. Creative activity goes deyond previous experience. Education implies going beyond previous experience while assimilation of previous experience is the expected result of training.[13]

It is particularly in the area of training for the acquisition of skills leading to reading that the "talking typewriter" is making a most crucial contribution, significantly for educationally deprived children.

The training program is available on a voluntary basis to all children for up to 20 minutes a day as part of an educational day care program from 7:30 A.M. to 5:30 P.M., five days a week. Breakfast, two snacks, and lunch are available to all children, as well as other ancillary services.

Research, to determine the areas, and extent, of effectiveness of new approaches to learning, is an integral part of the Early Childhood Center. This Center currently stands alone in using the "talking typewriter" with three, four, and five year old children.

The machine's primary purpose when initially conceived, was to teach reading. There is some evidence that if this is done at age six or later, this often leaves cognitive development in the early childhood years--years of tremendously rapid maturation and development--to chance environmental factors. Ample evidence exists, indicating the retarding effect upon psychological processes of certain environmental conditions. [14]

There is much speculation as to how early in life such intervention should take place. Nevertheless, there is considerable research evidence [15] to suggest that significant cognitive gains could be achieved by focusing more effort upon children younger than those now attending traditional programs.

Studies since 1966 at the Drexel Early Childhood Center indicate that an early intervention instructional program using the ERE provides a presently optimal learning environment, enhancing the effectiveness of instructional procedures: differential diagnosis, coupled with the use of a broad spectrum of remedial approaches, teaching to the strength of the learner and remediating inadequacies. These findings have been reported in the literature. [16]

Pre-post change scores revealed that training had a great impact on the development of psycholinguistic abilities. Furthermore favorable results were obtained in children with multiple behavior disorders, and, there was improvement in behavior factors other than intellectual achievement.

Cognitive processes are processes of understanding, of recognizing, of being conscious of things around oneself. Emotions, beliefs, prejudice or bigotry are all elements that can block human awareness. Cognitive processes make control (feedback) possible, a closed loop control. This means the recognition of signals for what they are, enabling the system to behave accordingly, to modulate its actions or responses.

The more a child learns the more he uses his cognitive processes. Otherwise he is guided by other factors such as emotion, beliefs or prejudice. When emotions are not the recourse, cognitive processes are used.
It is when cognitive processes are used to their fullest that man is most mature. This does not mean that man cannot be unbalanced. Man can be, and is, unbalanced. Hence human behavior and development requires the formulation of rules.

What seemed to have occurred was ever greater involvement, by each child, of cognitive processes with resultant increase in self-esteem, reported even verbally, and a lessening of impulsive and destructive behavior towards himself and others.

It is important to note that what is labelled motivation as causative in behavior requires its cause. Motivation is caused by something. It is similar to eating. Eating is necessary for the organism, but it is not the organism, it is not the system. Similarly with motivation, it is necessary for the system, but it is not the system. The same motivation may yield different results. However the mechanism, the system must be in working order and react to the outside world.

What is of importance in a system is the power action, like the effect of

an engine on a vehicle by which it starts moving, and the anti-effect, the brake that stops the motion. Food, or motivation, or any other ingredient that makes the engine turn over does not belong to the control system because it does not necessarily initiate the engine effort to move the vehicle forward or backwards, and it does not stop this action except in the way a lack of gasoline or clean spark plugs would affect the power supply. Thus, motivation is not an ingredient of control. The only ingredient of control is the direction given intelligently to the vehicle. The implications this has is that one should be independent of food, of motivation, or any other fixed relationship between input and output. We now consider the following case studies.*

The psychological report of A reads as follows:

> A. was admitted to the Center in September, 1969, when approximately two and a half years old. At that time a battery of tests were administered to evaluate her intellectual, perceptual, and psycholinguistic functioning levels. Intellectually, she was performing at the lower end of the dull-normal range. Her perceptual skills were practically non-existent. Her performance on the Illinois Test of Psycholinguistic Abilities was completely inadequate. Her emotional behavior was characterized by flatness of affect, extremely short attention span, perseveration, and symptoms of low self-esteem. Considerable prodding was necessary to obtain responses even to comparatively simple test items. Symptoms of malnutrition were also in evidence. During each year at the Center, she received the same evaluations noted above. After the first year, and each year thereafter, continual progress in intellectual, perceptual and psycholinguistic functioning was observed. Her emotional behavior improved markedly. At the time of her last testing (6/72) her mental age was nearly a year above her chronological age. Her ITPA score was half year above chronological expectation. Her word recognition skills were at the middle of the first reader level, while arithmetic achievement was approaching the second grade level. During the testing situation she was alert and quick, readily engaging the examiner in playful banter. She appeared extremely self-confident. She attempted every item despite difficulty of the material. The final testing revealed a youngster who appeared happy with herself, self-confident, and anxious to do well. Her academic skills were well within the first grade spectrum although not yet in the first grade. Prognosis for this child is excellent.

* Appreciation is due Mrs. Lois Baker, Director of the Drexel Early Childhood Center, whose efforts insure the continuation of the program.

Following is a teacher's annual report:

A. is presently a six year old Negro female well developed physically. She lives with her mother, father (who has recently completed a prison sentence) and 12 year old brother, son of her father by a previous marriage.

The focus of this report is the school year 1971-72. During this time, teachers have been focusing on three areas of A's development: her physical maturity which lead her to prefer the company of older children, especially teenagers; her extreme caution in entering an endeavor in which failure is a possibility; and her seemingly purposeless behavior.

A. was an isolate within her group and turned to adults as the major source of support. A's kindergarten unit consisted of boys who formed a group exclusive of girls, two boys who played with both sexes, one boy who was an isolate, and three girls who formed a cluster and with whom A. had infrequent interaction. These girls did not exclude A. and seemed to regard her as a leader when she joined their activities. The one girl with whom A. interacted frequently was transferred to another class as their behavior was extremely disruptive and A. dominated the relationship to such an extent that the other child was unable to initiate and direct her activities. Additionally, there had been incidents of sexual precocity involving A. and a boy in the room.

Two things seemed to help A. during the school year. Her teachers made a consistant effort to have A. help them in the classroom. Whereas in the beginning she would often retreat to a chair and pout, with all efforts to talk with her achieving little, she later was able to discuss those things which disturbed her. Gradually she became more responsive to the affections of the teachers and was able to initiate activities and contact with others. This made it easier to have A. become involved in classroom activities, especially those which she previously might have regarded as threatening. Also, given A's proclivity towards older individuals, the teachers and college students provided A. with positive role models.

A second course of action which seems to have benefitted A. is her work with the typewriter. As the year progressed, and as A. went from letter recognition to some word recognition, she frequently requested turns at the typewriter. A high point of the year involved a story A. had written. It was a rather long story, yet every day A. requested to go to the non-automated typewriter to type it. At times, A. would tell the operator that she would not be able to finish the story. She was also reluctant to terminate the sessions, even after half an hour. With some encouragement and with the operator determining A's point of fatigue, A. finished the story after two weeks. In view of her past fear of failure and inattentiveness, this was indeed a significant accomplishment. Using the Dukane viewer, she began to develop a sight vocabulary, and to request to use the viewer daily. Finally when in the classroom or on class trips, whenever she saw a word she would ask the teacher what it was, often spelling the word and saying it after having it read to her. In summary, it appears that the experience with the typewriter has enabled her to acquire basic reading skills, persistance and enjoy learning.

The Psychological report of T. reads as follows:

T. first came to the Center at the age of 2-11, in September of 1970. At that time he presented a lamentable picture. T. was quite thin, exhibiting many symptoms typically associated with undernourishment. He received the typical battery of tests to evaluate intellectual status, as well as to obtain indecises of perceptual and psycho-linguistic behavior. At that time he proved to be untestable. It was difficult to ascertain if he even understood what was expected of him. His speech was barely intelligible: he exhibited articulation difficulties as well as non-fluency patterns. His fine-motor coordination was quite poor. His gait was awkward. His social and mental maturity were estimated at the one year old level. Initially, his progress was slow indeed. Nevertheless, during his second year at the Center his social and emotional development, which appeared arrested during the entire first year, began to show definite indications of accelerating. He was then able to establish peer group relations although he was still generally quite apprehensive and was extremely soliticious with peers in his attempts to maintain friendships. During this second year, his intellectual and achievement levels were still markedly retarded. During his third year his social-emotional development accelerated at a rapid rate. He began to exhibit self-confidence and much stabler peer relationships. His social maturity level now closely approximates chronological expectation. Intellectually, he is now functioning within the borderline range. His global score of the ITPA is at the third year level. Visual and auditory perception have improved substantially. He is now able to handle basic mathematical concepts while his word recognition score on the Wide Range scale is at the 1.1 level.

In summary, the belief here is that this youngster has made remarkable overall improvement. Had he not received an early intervention program, the six year old briefly described here would almost certainly be facing an uncertain school career, probably marked by severe social and emotional inadequacies. Instead, T's general prognosis can be characterized as fair to good, depending upon the quality of educational, social, and emotional opportunities.

Teacher's report:

T. is a six year old Negro male. He was preceeded at the center by his now seven year old brother. Presently his four year old brother attends the center and plans are being made for the attendance of his two year old sister. T. lives with his brothers, sister and mother. Intermittently, his father returns home. The father's latest absence had been due to a prison sentence.

When 3 year old T. first came to the center, a staff member was assigned to him as he often ran to hide in small, dark places. When not hiding, he would watch the other children but seldom engaged in play. His major form of communication was tantrums.

Perhaps the most outstanding characteristic of T. is his visual acuity and imagination. In the beginning he was seeking dark secluded places. As time went on, however, this imagination and acuity began to present itself overtly. Once, when T. was gazing at a painting in a secluded

living room. T. suddenly turned to the teacher and said he was afraid and wanted to leave. The painting contained dark colors and was of people in a narrow street circa 1870. At another time, T. was staring at the face of a college student. Upon completing his assessment, he told the student, "Your face looks like an egg." And indeed the symmetry of this student's oval features was accurately and artistically stated by T.

T's experiences on the typewriter ranged from sessions which had to be terminated because of disruptive behavior (raising the plasticised cover of the keyboard's inner workings, which would have made the typewriter inoperative) to T's excitedly running out of the booth when he had made a new discovery. In the beginning, he would often request that the light in the typewriter booth be turned off while he typed. It was six months before T. showed letter recognition; at this point, he recognized "T" the first letter in his name. As was to happen whenever T. made a discovery, he continually typed T. for a number of sessions. Once he ran out of the booth and excitedly said "Gee! I'm smart!" In another instance, T. was typing numbers; when he typed "zero" he ran out of the booth shouting, "Zero, I typed zero, zero means nothing." Many sessions after this event consisted of T's typing "zero". The same persistant interest shown in the letter T and "zero" was applied by T. in learning his first word "owl". T. had shown great interest in a puzzle picture of an owl. A typewriter program about an owl was written. He repeatedly requested this story. Thus, on the typewriter, he continuously revealed an intense style of learning, completely exhausting one item before discovering another.

T. left the center in June of 1972. His verbal communication was quite fluent and contributed greatly to his sense of humor. By the time he left T. took a healthy pleasure in teasing his teachers.

In regard to the two children studied, no one can project with certainty what might have happened to them without educational intervention nor what will happen to them with intervention. Yet one of the purposes of education is to enable positive growth, development and training to occur. The concept of responsive environments as applied in the technology of the talking typewriter is a new tool whereby the learner can begin to develop attitudes about learning and substantial cognitive skills through which he can realize that he plays a significant role in controlling his environment. What is common to the children is their increase in confident behavior after establishing a core strength of intellectual ability and a positive attitude about the process through which they acquired that ability. What is peculiar to each is how this

confidence seemed to alleviate their particular problems. With A., her chaotic behavior in the classroom began to be self directed into constructive activity. The anxiety of many staff members that her sexual precocity would lead to early pregnancy began to diminish as she began to broaden her interest. The energies of T's active imagination which had been concentrated inward began to take delight in the outer world.

CONCLUSION

We have considered a program whose prime objective was deviation-amplification in intellectual or psycholinguistic development, and its possible relation to affective and social behavior and development. We have further considered other system features and adaptive and adapting systems. We need to stress that documentation has clearly shown that attempts to intervene by means of psychotherapy-like approaches by clinical psychologists, psychiatrists, and social workers, ~~to~~ improve childrearing practices of parents in chronic poverty by individual or group counselling--have failed completely to help the children of the parents.[17]

SUMMARY

Findings at the Early Childhood Center, based on observational evidence and psychological evaluation, over several years, provide substantial hope of preventing the almost pervasive incompetence in children of low-income families. Such educational and training intervention was not limited to only these children.

The program enhanced the acquisition of psycholinguistic skills (conceptual, linguistic and numerical) leading to changes in attitudes of self-esteem, all attributes necessary for continued success in our society.

However, while deviation-amplifying processes may explicate the workings of the system, we cannot entertain the illusion that the direction of the initial kick can be set, nor that this then determines subsequent deviation-amplification. All that pertains to education or training requires continuous use, or retraining. It is indeed puzzling why we expect a child who has learned to read, for instance, to maintain or progress in this learning, when we don't expect artists to make a comeback without extensive practice.

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